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10/724,897	12/02/2003	Yuan-Chi Chang	YOR920030555US1	2439

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EXAMINER	
PHAM, HUNG Q	

ART UNIT	PAPER NUMBER
2168	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/724,897	CHANG ET AL.	
	Examiner	Art Unit	
	HUNG Q. PHAM	2168	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8-19,21-31 and 33-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-19,21-31 and 33-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Claim Rejections - 35 USC § 101

- Applicant's arguments with respect to the useful result of claims 1, 14 and 26 under 35 U.S.C. § 101 have been fully considered but they are not persuasive. The claimed subject matter of claims 1, 14 and 26 lacks a practical application of a judicial exception (law of nature, abstract idea, naturally occurring article/phenomenon) since it fails to produce a useful result. Specifically, the claimed subject matter does not produce a useful result because the claimed subject matter fails to sufficiently reflect at least one practical utility set forth in the descriptive portion of the specification. More specifically, while the described practical utility (utilities) is (are) directed to *indexing, searching and retrieving of semantic objects* (Specification, Page 1 Lines 9-11), the claimed subject matter relates ONLY to *indexing the summary of attributes* and *storing the summary of attributes and the index*.

- The rejection of claims 14-25 with respect to a signal-bearing medium that stores program instructions under 35 U.S.C. § 101 has been withdrawn in view of the amendment.

- Applicant's arguments with respect to the system comprising software per se have been fully considered but they are not persuasive. Software per se is not one of the four categories of invention. Software per se is not a series of steps or acts and thus is not a process. Software per se is not a physical article or object and as such is not a machine or manufacture. Software per se is not a combination of substances and therefore is not a composition of matter. Therefore claims 26-37 are non-statutory.

Claim Rejections - 35 USC § 102 or 103

- Applicant's arguments with respect to the rejection of claims 1-6, 8, 9, 12-19, 21, 22, 25-31, 33, 34 and 37 under 35 U.S.C 102/103 have been fully considered but they are not persuasive.

As argued by applicant:

(1) At Page 12 Lines 2-12:

None of the applied references teaches or suggests the features of the claimed invention including summarizing, indexing, and storing attributes of a semantic object derived from geological seismic survey data. These features are important for efficiently and easily analyzing geological seismic survey data.

As explained above, the Bergman et al. reference does not teach or suggest these features.

The Li et al. reference [1] does not remedy these deficiencies.

Rather, and in stark contrast, the Li et al. reference [1] discloses how the selection of optimal texture features for texture feature based similarity retrieval is highly application dependent. While the Li et al. reference [1] discloses that seismic data may be used for petroleum exploration, the Li et al. reference [1] does not teach or suggest that texture feature based similarity retrieval has anything at all to do with seismic data.

(2) At Page 12 Line 13-Page 13 Line 7:

The Examiner alleges that the Li et al. reference [1] teaches that geological seismic survey data (as claimed) "is an inherited feature for generating texture features." However, contrary to the Examiner's allegation, texture feature sets are completely different and are entirely unrelated to seismic data.

Texture features are only useful for interpreting images. Texture features in geology refer to the physical appearance or character of a rock, such as grain size, shape, and arrangement at both the megascopic or microscopic surface feature level. This includes the geometric aspects and relations among the component particles or crystals which is called the crystallographic texture or preferred orientation. The term structure is generally used for larger features. Texture features are not useful for interpreting geologic seismic data.

The Examiner also alleges that "obviously geological seismic survey data .... is used to generate texture features." While it may be possible to generate texture features using geological

seismic survey data, geological seismic survey data is not used to generate texture features because such texture features are not useful.

If the Examiner intends to continue to allege that "obviously geological seismic survey data .... is used to generate texture features" the Applicants hereby demand that the Examiner provide evidence supporting such an allegation.

(3) At Page 13 Lines 15-27:

Further, with respect to claims 12, 25, and 37, the Examiner alleges that the Bergman et al. reference discloses the confidence level represents a degree of accuracy of classification for the semantic object. Contrary to the Examiner's allegation, the Bergman et al. reference does not teach or suggest this feature.

Rather, the Bergman et al. reference discloses similarity scores. Similarity scores and confidence levels are substantially different things. A similarity score is the result of comparing two objects, two arbitrary individuals, to each other, and summarizing the differences. A confidence-in-classification level is the result of comparing one object to an abstract class in some arbitrary manner. This might entail comparing the object to every individual previously known to be in that class, or it might be a rule based approach. Further, groups of individuals might form multiple clusters inside a class. For example, the similarity score between a Chihuahua and a Doberman might be very low, (depending upon the features chosen to compare) but the confidence in their classification as dogs would be equal i.e., 100 percent for each.

The examiner respectfully disagrees.

(1) In response to applicants' arguments at Page 12 with respect to the *geological seismic survey data*, the recitation *geological seismic survey data* has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Additionally, as taught by Bergman at Page 457 Lines 32-42, SPIRE implements the Li's algorithm for selecting texture features. As taught by Li at Page 2, in petroleum exploration, other than core images, seismic data is used for extracting texture features. Thus, seismic data is an inherited feature in Bergman reference.

(2) In response to applicants' arguments and request for evidence with respect to the relations and usefulness of texture features and seismic data, the examiner respectfully directs the applicants to "PetroSPIRE: Indexing and retrieval of seismic data for oil and gas exploration", which is an IDS reference and co-authored by the applicants. As disclosed in this reference texture features are extracted from seismic data using Li technique, and texture features are useful for interpreting seismic data ("PetroSPIRE: Indexing and retrieval of seismic data for oil and gas exploration", Extracting objects from seismic data).

(3) Regarding claims 12, 25 and 37, as disclosed at Page 458 Lines 12-14, the Bergman reference taught that objects of the same class have a similarity of one. Objects of different classes have similarity of zero. The similarity score as taught by Bergman *represents a degree of accuracy of classification for the semantic object.*

In light of the foregoing arguments, the rejection of claims 1-6, 8, 9, 12-19, 21, 22, 25-31, 33, 34 and 37 under 35 U.S.C 102/103 is hereby sustained.

- Applicant's arguments with respect to the rejection of claims 10, 11, 23, 24, 35 and 36 under 35 U.S.C. § 103 have been fully considered but they are not persuasive.

As argued by applicant:

At Page 15:

> *None of the applied references teaches or suggests the features of the claimed invention including summarizing, indexing, and storing attributes of a semantic object derived from geological seismic survey data. These features are important for efficiently and easily analyzing geological seismic survey data.*
>
> *As explained above, neither the Bergman et al. reference nor the Li et al. reference [1] teaches or suggests these features*
>
> *The Li et al. reference [2] does not remedy these deficiencies.*
>
> ...
>
> *Therefore, the Examiner is respectfully requested to withdraw the rejection of claims 10-11, 23-24, and 35-36.*

The examiner respectfully disagrees. As discussed above with respect to the Li [1] reference of seismic data and the relations and usefulness of semantic object and texture features, the Li [1] reference teaches the seismic data for deriving semantic object. Therefore, the rejection of claims 10, 11, 23, 24, 35 and 36 is sustained.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-6, 8-19, 21-31 and 33-37 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The claimed subject matter of claims 1-6, 8-19, 21-31 and 33-37, especially claims 1, 14 and 26 lacks a practical application of a judicial exception (law of nature, abstract idea, naturally

occurring article/phenomenon) since it fails to produce a useful result. Specifically, the claimed subject matter does not produce a useful result because the claimed subject matter fails to sufficiently reflect at least one practical utility set forth in the descriptive portion of the specification. More specifically, while the described practical utility (utilities) is (are) directed to *indexing, searching and retrieving of semantic objects* (Specification, Page 1 Lines 9-11), the claimed subject matter relates ONLY to *indexing the summary of attributes* and *storing the summary of attributes and the index.*

Claims 26-37 direct to a system comprising software per se. Software per se is not one of the four categories of invention. Software per se is not a series of steps or acts and thus is not a process. Software per se is not a physical article or object and as such is not a machine or manufacture. Software per se is not a combination of substances and therefore is not a composition of matter. Therefore claims 26-37 are non-statutory.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 8, 9, 12-19, 21, 22, 25-31, 33, 34 and 37 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bergman et al. [PetroSPIRE: A multi-modal content-based retrieval system for

petroleum applications] and Li et al. [Comparing Texture Feature Sets for Retrieving Core Images in Petroleum Application].

Regarding claims 1, 13, 14 and 26, Bergman teaches ***a method for storing a semantic object*** (Bergman, Abstract), the method comprising:

summarizing attributes of said semantic object (Bergman, Page 457 Lines 45-47, extracting a vector of feature values);

indexing the summary of attributes (Bergman, Pages 457 Lines 50-51, indexing feature values); and

storing the summary of attributes and the index of the summary of attributes (Bergman, Page 457 Lines 45-46, storing vector of extracted features values of the semantic object; Page 457 Line 50, storing the index of feature values as an R-Tree), ***wherein said summary of attributes comprises one of a slice label, a signal strength, and a coordinate of a surveyed segment*** (Bergman, Page 454 Lines 11-15, features is assigned a semantic label as *slice label*).

The missing of Bergman is ***geological seismic survey data*** for deriving semantic object.

However, as taught by Bergman at Page 457 Lines 32-42, SPIRE implements the Li's algorithm for selecting texture features. As taught by Li at Page 2, in petroleum exploration, other than core images, seismic data or ***geological seismic survey data*** is used for extracting texture features.

By incorporating Li's technique in SPIRE, ***geological seismic survey data***, e.g., seismic data, is an inherited feature for generating texture features.

Regarding claim 1, 13, 14 and 26, Bergman teaches ***a method for storing a semantic object*** (see Abstract), the method comprising:

summarizing attributes of said semantic object (Page 457 Lines 45-47, extracting a vector of feature values);

indexing the summary of attributes (Pages 457 Lines 50-51, indexing feature values); and

storing the summary of attributes and the index of the summary of attributes (Page 457 Lines 45-46, storing vector of extracted features values of the semantic object; Page 457 Line 50, storing the index of feature values as an R-Tree), ***wherein said summary of attributes comprises one of a slice label, a signal strength, and a coordinate of a surveyed segment*** (Page 454 Lines 11-15, features is assigned a semantic label as *slice label*).

The missing of Bergman is ***geological seismic survey data*** for deriving semantic object.

However, as taught by Bergman at Page 457 Lines 32-42, SPIRE implements the Li's algorithm for selecting texture features. As taught by Li at Page 2, in petroleum exploration, other than core images, seismic data or ***geological seismic survey data*** is used for extracting texture features.

By incorporating Li's technique in SPIRE, obviously ***geological seismic survey data***, e.g., seismic data, is used to generate texture features.

Regarding claims 2, 15, and 27, Bergman further discloses ***the semantic object comprises a summary representation of raw data measurements*** (Bergman, Page 454 Lines 11-12, indicating that features are extracted from raw data).

Regarding claims 3, 16, and 28, Bergman further discloses the step of ***searching a database of a plurality of indexed attributes of semantic objects*** (Bergman, Page 459 Lines 33 and 41, querying a database which includes an index of texture features).

Regarding claims 4, 17, and 29, Bergman further discloses the step of ***searching the index of the plurality of semantic object attributes to identify a semantic object having attributes that match a query and retrieving the identified semantic object*** (Bergman, Page 452 Lines 18-20, using a semantic definition to search the archive, and subsequently returning the results).

Regarding claims 5, 18, and 30, Bergman further discloses ***an optimizing mechanism is used in searching to optimize the process of searching*** (Bergman, Page 459 Lines 7-10, indicating a dimensionality reduction algorithm that locally reduces the dimensionality of the search space. Lines 5-6 indicate that the search process can be extremely time-consuming if a linear scan is performed, hence, the dimensionality reduction algorithm is presented as a time-saving optimization to the search process).

Regarding claims 6, 19, and 31, Bergman further discloses ***the semantic object represents a model of a phenomena of interest that is measured by a collection of data which exceeds a data size that is accessible with a predetermined efficiency by multiple simultaneous users*** (Bergman, Page 449 Lines 27 and 35, indicating that the semantic objects represent phenomena related to petroleum well-bore data, and that the volume of this data is extremely large).

Regarding claim claims 8, 21, and 33, Bergman further discloses ***the index of the summary of attributes comprises a plurality of key features that have been resolved into a set of data points and summary statistics*** (Bergman, Page 457 Lines 50-51, where summary statistics is read on feature values, because both consist of values summarized from a semantic object).

Regarding claim claims 9, 22, and 34, Bergman further discloses ***the summary of attributes comprises one of a confidence level, summary statistics and a compact approximation*** (Bergman, Page 457

Lines 46-47, where summary statistics is read on vector of feature values, because both consist of values summarized from a semantic object).

Regarding claims 12, 25, and 37, Bergman further discloses ***the confidence level represents a degree of accuracy of classification for the semantic object*** (Bergman, Page 458 Lines 12-14, indicating a similarity of zero or one between objects, zero indicating that the objects do not belong to the same class, one indicating that the objects do belong to the same class).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 10, 11, 23, 24, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergman et al. [PetroSPIRE: A multi-modal content-based retrieval system for petroleum applications] and Li et al. [Comparing Texture Feature Sets for

Retrieving Core Images in Petroleum Application] in view of Yu et al. [A Framework for Mining Sequence Database at Multiple Abstraction Levels].

Regarding claims 10, 23, and 35, Bergman does not explicitly teach ***the compact approximation comprises a multiple segment polyline***.

Yu teaches ***the compact approximation comprises a multiple segment polyline*** (Yu, Page 268 Col. 1 Lines 1-8, segmenting data, then finding a linear approximation to each segment. These line segments comprise a polyline, since a polyline is simply a line comprised of one or more line segments (see Wikipedia definition of polyline included in this Office Action)).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have modified the method of summarizing a semantic object taught by Bergman by the method of approximating data by a polyline taught by Yu, because approximating a semantic object by a polyline enables similarity searches, particularly to identify data with similar geological features (Yu, Page 267, Col. 1 Lines 6-11 and Col. 2 Lines 4-6).

Regarding claims 11, 24, and 36, Yu further discloses ***each segment of the multiple segment polyline comprises a best fit line having end point coordinates and a slope*** (Yu, Page 270 Col. 1 Lines 22-25, showing the segments have endpoints; Page 270 Col. 1 Lines 41-43, showing the segments have a slope).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUNG Q. PHAM whose telephone number is 571-272-4040. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, TIM T. VO can be reached on 571-272-3642. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you

would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HUNG Q PHAM
Examiner
Art Unit 2168

April 21, 2007